

# SOMERSAULT

JULY 2011  
Vol 34, No 4

SIGNALLING RECORD SOCIETY OF VICTORIA INC



*The Down Location Board at Maldon on the Victorian Goldfields Railway is to drawing F4060. This drawing was dated 19 September 1947 and consisted of a white painted triangle three feet on a side. The triangle is constructed from timber boards. Beneath the triangle is a detachable name board 4 inches high. The name board has the location in 3 inch letters painted upon it, although how much use that was to the loco crew approaching the station is highly questionable. The bottom of the name board was to be 6 feet above rail level. The location board at Maldon was provided on 22 May 1962 when the home signal and plunger locking was taken out of use. This was as part of a policy on the VR at this time to remove plunger locking from branch line termini where it was unlikely that two trains would be there at once. Plunger locking has been re-instated at Maldon since the VGR reopened the line, but the location board still exists.*

## SOCIETY CONTACT INFORMATION

Published by the Signalling Record Society Victoria Inc (A0024029F)

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MINUTES OF MEETING HELD FRIDAY MAY 20, 2011,  
AT THE SURREY HILLS NEIGHBOURHOOD CENTRE, 1 BEDFORD AVENUE, SURREY HILLS

- Present: - Wilfrid Brook, Brett Cleak, Graeme Cleak, Glenn Cumming, John Dennis, Mike Drew, Graeme Dunn, Vance Findlay, Michael Formaini, Ray Gomerski, Andrew Gostling, Bill Johnston, Chris King, Keith Lambert, David Langley, Steve Malpass, Andrew McLean, Tom Murray, Peter Silva, David Stosser, Damian Thomas, Andrew Waugh, Andrew Wheatland and Bob Whitehead.
- Apologies: - Jon Churchward, Chris Gordon, Judy Gordon, Greg O'Flynn, Trevor Penn, Laurie Savage and Stuart Turnbull.
- Visitor: - Tony Howker.
- The President, Mr. David Langley, took the chair & opened the meeting @ 20:13 hours, following the completion of the 2011 Annual General Meeting.
- Minutes of the March 2011 Meeting: - Accepted as read. Graeme Dunn / Andrew Wheatland. Carried.
- Business Arising: - Tom Murray asked about works at Newport South. Will there be a connection from the new stabling sidings at Newport to the Werribee Line? Glenn Cumming noted that recent works at Champion Road Newport South had involved the oil pipelines.
- Correspondence: - Letter from Surrey Hills Neighbourhood Centre detailing conditions of hire for the Meeting Room.  
Invoice from Local Community Insurance Services for the renewal of the public liability insurance.  
Invoice from Surrey Hills Neighbourhood Centre for the hire of the Meeting Room.  
Letter from Michael Menzies of the Geelong & South Western Rail Heritage Society inviting the SRSV to participate in the planned celebrations of the 150th Anniversary of the opening of the Geelong & Ballarat Railway during April 2012. Specifically, the SRSV has been asked to assist with the provision of information regarding signalling and interlocking on the Geelong - Ballarat Line and assisting with a display in the signal box at Meredith Railway Station. Steve Malpass / Bob Whitehead. Carried.
- Reports: - Glenn Cumming suggested that the next signal box tour would be on the Frankston Line on Saturday 17 September 2011 and work would start on this plan unless a better suggestion was made.
- General Business: - The Secretary reminded everybody that membership renewals were now due.  
Keith Lambert reported that it is proposed to have control of Sydenham transferred to Craigieburn Signal Box. This work is expected to be completed in July 2011 and testing is already in progress.  
Graeme Dunn asked how trains will terminate at Albion during the forthcoming occupation. Keith Lambert explained that passengers will disembark the train at Albion to connect with buses and the train will continue to Sunshine to reverse. Apparently it is easier to transfer to buses at Albion and the buses have easier access to and from Ballarat Road at Albion.  
Bob Whitehead described the installation of point machines at Shepparton.  
Bob Whitehead reported on the derailment at Raywood last week.  
Vance Findlay discussed the recent thefts of copper wire around the metropolitan network.  
Chris King noted that copper bonds are gradually being replaced by aluminium bonds.  
Bob Whitehead advised that the Crowes Narrow Gauge Line Centenary will be celebrated on the weekend of Saturday 18 June and Sunday 19 June 2011.  
Vance Findlay discussed various arrangements on the Sandringham Line.  
Chris King asked if the buffer stop at Crowes is still in place. Yes, it is and it is maintained by volunteers.  
Brett Cleak provided details of proposed works on the Western Standard Gauge Line. A summary of the discussion follows: -  
Laverton Loop is to be extended to 1850 metres in length.

A new connection to a siding for Westgate Ports is to be provided in the Newport – Laverton Loop section.

Manor Loop is to be relocated a short distance to allow for the construction of the flyover for the Regional Rail Link project.

The new crossing loop at Elders Loop is expected to be commissioned during July 2011.

The North Geelong – Moorabool duplication is expected to be commissioned before Christmas 2011.

Four additional crossing loops are to be provided between Gheringhap – Maroona and CTC will be provided at the same time.

Graeme Cleak advised that the extended Donnybrook Loop is expected to be commissioned in June and July 2011.

Andrew Waugh noted that an ATSB report into an incident at Manildra NSW had been released. The report includes a description on Train Order working in New South Wales. The NSW style of Train Order working was discussed.

Syllabus Item: - The President introduced visitor Tony Howker to present the Syllabus Item.

A C (Tony) Howker is a professional signal engineer with over 50 years experience and has served as Managing Director of Westinghouse Brake and Signal Company in the UK. Tony is a past-president of the IRSE and an Honorary Fellow (i.e. life member) of the IRSE. Tony has spoken at a number of SRSUK meetings in the past

Tony commenced his presentation with a PowerPoint presentation entitled "Signalling Principles in Plain English".

This presentation was followed by a digital slide show of recent scenes of railway signalling in Victoria, past scenes of railway signalling in the United Kingdom and a detailed coverage of the signalling on the Great Cockrow Railway in Lyne, Surrey.

The presentation was thoroughly enjoyed by those present.

At the completion of the Syllabus Item, The President thanked Tony for the entertainment & this was followed by acclamation from those present, along with the promise of a future invitation for another presentation.

Meeting closed at 22:12 hours.

The next meeting will be on Friday 15 July, 2011 at the Surrey Hills Neighbourhood Centre, Bedford Avenue, Surrey Hill, commencing at 20:00 hours (8.00pm).

## SIGNALLING ALTERATIONS

*The following alterations were published in WN 14/11 to WN 22/11 and ETRB A circulars. The alterations have been edited to conserve space. Dates in parenthesis are the dates of publication, which may not be the date of the alteration.*

- (12.04.2011) **Craigieburn** (SW 147/11, WN 14)  
Stabling Siding No 13 was booked out of service due to a track circuit issue. Points 456U have been secured normal.
- 12.04.2011 **Warnambool** (SW 44/11, WN 13)  
On Tuesday, 12.4., new style location boards were provided 2500 metres in the rear of the Home signal. Amend Diagram 28/11 (Warnambool - Dennnington).
- 13.04.2011 **Ballarat - Creswick** (SW 49/11 & 50/11, WN 14)  
On Wednesday, 13.4., boom barriers were provided at the passive crossings at Rosehill Rd (161.834 km) and Frasers Rd (162.675 km). Operation is via predictors and remote monitoring is provided. Trains travelling at more than 50 km/h at the predictor boards can accelerate before reaching the crossings. Amend Diagram 32/10 (Sulky - Talbot).
- 14.04.2011 **Ballarat - Creswick** (SW 51/11 & 52/11, WN 14)  
On Thursday, 14.4., boom barriers were provided at the passive crossings at Blackmore Rd (166.876 km) and Taronga Rd (164.497 km). Operation is via predictors and remote monitoring is provided. Trains travelling at more than 50 km/h at the predictor boards can accelerate before reaching the crossings. Amend Diagram 32/10 (Sulky - Talbot).
- 14.04.2011 **Sale** (SW 46/11, WN 13)  
On Thursday, 14.4., new style location boards were provided 2500 metres in the rear of the Home signal. Amend Diagram 4/10 (Traralgon - Sale). SW 45/11 is cancelled.
- 17.04.2011 **Newport** (SW 139/11, WN 15)  
On Sunday, 17.4., Siding E was baulked 480 metres on the Down side of Dwarf NPT726 and 200 metres of track removed to facilitate Stage 3 of the Newport Stabling Sidings project. Note that Newport Points 615 and Newport South Points 165 remain secured normal.
- 18.04.2011 **Toolamba - Echuca** (SW 56/11, WN 15)  
At 1450 hours, Monday, 18.4., the Toolamba - Echuca line was booked out of service due to track condition. The junction points at Toolamba were secured normal, and a baulk was provided at Echuca at the Stop board on the Up side of the Murray Valley Highway.

- 20.04.2011 **Waurm Ponds** (SW 53/11 & 55/11, WN 15)  
Between Wednesday, 20.4., and Thursday, 21.4., the Anglesea Rd level crossing was relocated from 86.384 km to 86.130 km. The crossing remains protected by boom barriers. Diagram 48/11 (Waurm Ponds - Winchelsea) replaced 24/11.
- (27.04.2011) **Echuca** (TON 60/11, WN 16)  
The turntable road was booked back into service. TON 12/09 is cancelled.
- 27.04.2011 **Spencer St** (SW 158/11 & 162/11, WN 15 & 16)  
Between Thursday, 21.4., and Wednesday, 27.4., Crossover 025 (between the City Circle Viaduct line and the Burnley Viaduct Line) was replaced by a tangential crossover on concrete sleepers 67 metres in the Down direction. The replacement crossover was not brought into service. Home 303 was replaced by a tri-colour LED mast located 2.5 metres in the Down direction. Crossovers 205 and 466 were abolished and Points 205U and 466U were removed. The 'C', 'G', and 'T' indications on the theatre route indicator on Home 305 were removed.  
Due to restrictions of track geometry associated with the relocation of Crossover 025, movements cannot be made over both Points 025 and 203 reverse. The interlocking has been altered to prevent the following routes from being set: Home 125 to Home 303 with the overlap set towards Homes 121, 535, or 555; and Homes 128, 536, 548 to Home 028.  
Diagram 27/11 (Southern Cross Passenger Lines) replaced 37/09.
- 28.04.2011 **Clunes** (SW 57/11, WN 16)  
On Thursday, 28.4., the flashing lights at Learmonth Rd (193.362 km) were converted to be operated by predictors. Trains travelling at more than 50 km/h at the predictor boards can accelerate before reaching the crossings. Amend Diagram 32/10 (Sulky - Talbot).
- 01.05.2011 **Newport South - Laverton** (SW 169/11, WN 17)  
On Sunday, 1.5., the level crossing protection equipment was removed from the former level crossing at Kororoit Ck Rd.
- 02.05.2011 **Brim** (TON 68/11, WN 17)  
On Monday, 2.5., the siding was booked out of service due to sleeper condition.
- 06.05.2011 **Donald** (TON 74/11, WN 18)  
On Friday, 6.5., Freezer Track No 2 at the Donald Sub-Terminal was booked out of use due to sleeper condition.
- 07.05.2011 **Ballarat - Maryborough** (SW 59/11, WN 17)  
On Saturday, 7.5., and Sunday, 8.5., steam shuttles will be operated between Ballarat and 167.000 km on the Maryborough line. The shuttles will be operated by Y112 and D3639 in a push pull mode. There will be six return trips.  
Permission is granted for a single train order to be issued to cover all trains in a given day. The train order must include the train numbers of the first and last trains for the day. The suggested wording of the Train Order is 'Work between North Ballarat and Maryborough as required'. The Train Order is to be verified by both locomotive drivers and is to be retained by one of the drivers. The Train Order does not need to be held on the lead locomotive, but prior to departing from Ballarat the two drivers are to confirm that one of the drivers holds the Train Order.
- 07.05.2011 **Eltham** (SW 173/11 & 175/11, WN 17 & 18)  
On Saturday, 7.5., automatic pedestrian gates were provided at Else St/Railway Pde Bike Track (28.009km). The existing crib pedestrian crossing (27.810km) was closed. Amend Diagram 83/10 (Watsonia - Eltham) replaced Diagram 97/07 (or 79/07?).
- 12.05.2011 **Clunes** (SW 60/11 & 61/11, WN 18)  
On Thursday, 12.5., boom barriers were provided at the passive crossings at Rose's Lane (194.010 km) and Cemetary Rd (194.904 km). Operation is via predictors and remote monitoring is provided. Trains travelling at more than 50 km/h at the predictor boards can accelerate before reaching the crossings. Amend Diagram 32/10 (Sulky - Talbot).
- 15.05.2011 **Craigieburn** (SW 184/11, WN 18)  
On Sunday, 15.5., the following alterations were carried out to the interlocking:  
\* Removal of the speed proving on CGB537 and CBG539 when approached via platform 1 (timing on E828T and E831T).  
\* Provision of telephones at CGB508, CGB516, CGB517, CGB519, and CGB520.  
\* Resolve an issue with the interlocking on Points 448. After the issue is resolved, No 13 Siding will be booked into service and SW147/11 will be cancelled.  
\* Complete and test the interlocking between the signalling system and the train washing plant.
- 16.05.2011 **Sandringham** (SW 188/11, WN 19)  
On Monday, 16.5., Siding No 2 was reduced in length by 2.5 metres and buffer stops replaced the baulks. Amend Diagram 63/09 (Prahan - Sandringham).
- (17.05.2011) **Eltham** (SW 190/11, WN 19)  
To prevent excessive operation of the pedestrian crossing at Else St/Railway Pde bike track, it is not permitted to shunt trains outside Post 11. Any shunting movement at the Down end must run through the section to Diamond Creek or Hurstbridge.

- 22.05.2011 **Dandenong** (SW 174/11, 183/11 & 193/11, WN 17, 18, & 20)  
 On Sunday, 22.5., the following alterations were carried out as part of the TPWS trial.  
 Home DNG706 was replaced by a new LED mast located 2 metres in the Down direction. Home DNG716 was relocated from the signal bridge to a LED ground mast located 2 metres 'in front' (sic) of the signal bridge on the right hand side of the line. A co-acting signal was provided on the left hand side of the line. Home DNG726 was converted to have LED heads and the ladder and landings were replaced.  
 TPWS was fitted to Homes DNG706, DNG716, and DN726. Start and End TPWS boards were erected 20 metres on the Up side of DNG704 and 20 metres on the Down side of DNG706, DNG716, and DNG726.
- (24.05.2011) **Beaufort** (TON 88/11, WN 20)  
 The level crossing at Candlebark Lane (168.844 km) was closed to road traffic.
- 28.05.2011 **Sandringham** (SW 201/11, WN 20)  
 On Saturday, 28.5., Siding No 1 was reduced in length by 2.5 metres to allow provision of a buffer stop.  
 Amend Diagram 63/09 (Prahan - Sandringham).
- 29.05.2011 **Frankston - Stony Point** (SW 199/11, SWP 4/11 & 5/11, WN 20)  
 Commencing at 0300 hours on Sunday, 29.5., train control for the Frankston - Stony Point line was transferred from Centrol to the Caulfield Group Train Controller at Metrol.  
 Operating Procedures 46 (Frankston - Stony Point ATC section, Failure of Signals) and 48 (Frankston - Stony Point, Axle Counter System and Reset Procedures) were reissued.
- 30.05.2011 **Newport** (SW 203/11, WN 20)  
 On Monday, 30.5., the following alterations took place.  
 \* Points 617D and 681 were provided (but not commissioned) in the Up Williamstown line. The points are of the tangential type and are equipped with M23A point machines.  
 \* Points 622 were provided (but not commissioned) in the lead to the Newport Workshops. The points are of the tangential type and are equipped with M23A point machines.  
 \* Derail 623D in the lead to the Outer West Block Road will be commissioned.  
 \* Dwarfs NPT711 and NPT713 (Altona Car Sidings) will be converted to LED. Stop will be shown by a purple light.  
 \* Home NPT717 was converted to multi-aspect LED heads.  
 \* Dwarf NPT733 was equipped with a operating train stop.
- 30.05.2011 **Thomastown** (SW 208/11, WN 21)  
 On Monday, 30.5., the pedestrian crossing at the Down end of Thomastown was extended to double track width.
- (31.05.2011) **Aircraft - Little River** (SW 207/11, WN 21)  
 Diagrams 15/11 (Aircraft - Werribee) and 30/11 (Werribee Racecourse - Little River) replaced 81/10 and 2/11 respectively as in service.
- 02.06.2011 **Warracknabeal** (TON 92/11, WN 22)  
 On Thursday, 2.6., No 2 Road was booked back into service. TON 682/10 is cancelled.
- 02.06.2011 **North Creswick - Clunes** (SW 69/11 & 70/11, WN 21)  
 On Thursday, 2.6., boom barriers were provided at the passive crossings at Cattle Station Rd (181.934 km) and Cooks Rd (188.566 km). Operation is via predictors and remote monitoring is provided. Trains travelling at more than 50 km/h at the predictor boards can accelerate before reaching the crossings.  
 Amend Diagram 32/10 (Sulky - Talbot).
- 02.06.2011 **Korong Vale - Robinvale** (TON 93/11 & 94/11, WN 22)  
 On Thursday, 2.6., the section of line Korong Vale Junction - Ultima Block Point was booked back into service. The section of line Dunolly - Korong Vale Junction remains booked out of service and baulks are provided at 281.350 km. The section of line Manangatang Block Point - Robinvale was booked back into service on one circular and immediately booked out again on the second due to track condition.  
 TON 25/11 is cancelled.
- 03.06.2011 **Dunolly - Korong Vale** (TON 95/11, WN 22)  
 On Friday, 3.6., the section of line Dunolly - Korong Vale was booked back into service. The junction points at Dunolly were unspiked and the baulks at 281.350 km were removed.
- 03.04.2011 **Korong Vale - Mittyack** (TON 97/11, WN 22)  
 On Friday, 3.6., the section of line Korong Vale - 422.800 km (on the Down side of the Sea Lake AWB Outloading Facility at 421.906km) was booked back into service. The section between 422.800 km and Mittyack remains booked out service due to track condition and the electrical power to the level crossing at Calder Hwy at Mittyack (466.983 km) was disconnected. Baulks were provided at 422.800 km. TON 26/11 is cancelled.
- 04.06.2011 **Geelong, South Geelong, Marshall** (SW 74/11, WN 22)  
 On Saturday, 4.6., the Aspectus control screens at Geelong and Marshall will be updated to provide the following indications: level crossing indications and alarms for Yarra St, Swanston St, and Wood St, and workstation failure alarms for Marshall. In addition, the static indications for Geelong Racecourse were removed.  
 On the same date the switch out arrangements at South Geelong were tested, but not commissioned.  
 Closing lever 18 will be secured normal at the end of the test.

## S 'TYPICALS' DRAWINGS INDEX

Damien Thomas

The following index of the 'S' typical drawings has been prepared by Damien Thomas from the card register held at PROV (VPRS 13636).

The S series 'typical' drawings were (are?) small diagrams commonly showing the circuits or standard wiring of signalling components such as block instruments, point mechanisms, and so on. Normally they were made up into small booklets issued to electrical fitters and workshops. Examples of the booklets can be found in VPRS 13638 (Technical Manuals and Drawings, Electrical Workshops, Rail

Maintenance Division).

It appears that the card register (VPRS 13636) was primarily used to control the issue of official prints of signalling drawings to workshops and supervisors. In particular, it ensured that updated drawings were issued when drawings were modified.

The 'R Number' is the registered number in the VR Plan Room. As can be seen, most of the S series drawings were not registered in the Plan Room system. The tracings presumably were not held in the plan room.

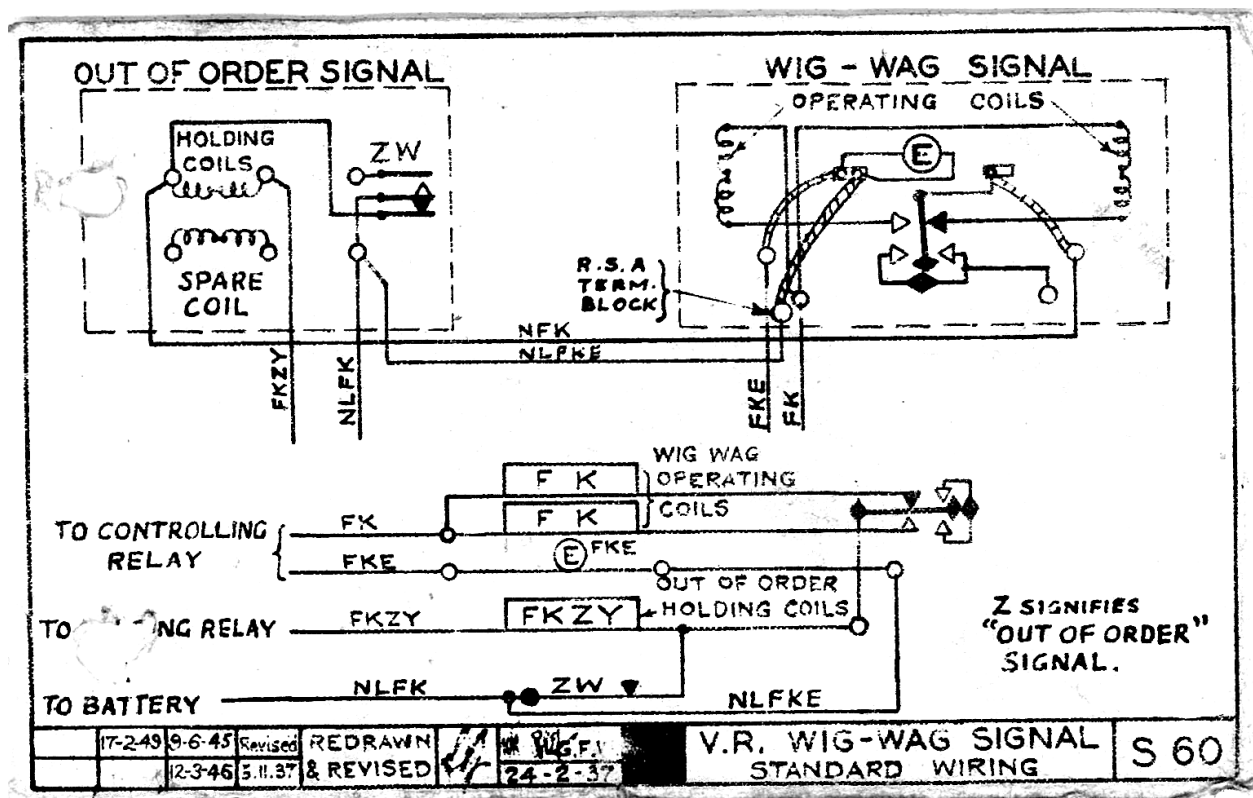
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	89	Unused	
	90	Unused	
	91	Unused	
	92	Unused	
	93	Unused	
	94	Unused	
	95	Unused	
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<b>R</b>	<b>S</b>	<b>Location/Subject</b>	<b>Type</b>
<b>Number</b>	<b>Number</b>		
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146		Reserved for Relay Connection Diagram	
147		Reserved for Relay Connection Diagram	
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149		Reserved for Relay Connection Diagram	
150		D.C. Combined Lever Lock	Wiring Diagram
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152		Track Circuits SP.C.L.	Relay Connections
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162		P3T Relay	Connection Diagram
163		D(or M) 2B 6 Way Relay	Connection Diagram
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R Number	S Number	Subject	Type
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167		V3R Relay	Connection Diagram
168		D2F (G.R.S.) Relay	Connection Diagram
169		D2F (McK.&H.) Relay	Connection Diagram
170		V3W Relay	Connection Diagram
171		A2A Relay	Connection Diagram
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174		Switchgear and Transformer for Signal Locations	
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177		Type T2 D.C. Signal Mechanism - Improved	Wiring Diagram
178		Unused	
179		Switch Repeat Circuits - McK.&H. Type Controller	
180		Switch Circuit Controller - McK.&H. Type	Setting of Cams
181		Unused	
182		Type SA Searchlight Signal - Auto Signal	Control Circuits
183		Type SA Searchlight Signal - Back View	Standard Wiring
184		Point Mechanism D.C. Model 5	Wiring Diagram
185		Electric Staff - Consecutive Switchout Stations - Non-Interlocked	
186		Electric Staff Section with Subsidiary Staff Station	Circuits
187		Subsidiary Staff Station with Standard Terminal Switchboard	
188		Electric Staff - Switchout Station - Interlocked - Metallic Return Wiring	
189		Electric Staff - Switchout Station - Non-Interlocked - Metallic Return Wiring	
190		Supervisory Control of 2200V Switch - 50V Operation	Circuits
191		Supervisory Control of 2200V Switch - 50V Operation	Wiring Diagram
192		Supervisory Control of 2200V Switch - 50V Operation	Circuits
193		Supervisory Control of 2200V Switch - 50V Operation	Wiring Diagram
194		Unused	
195		Unused	
196		Dimming Light Signals	Circuits
197		H2N2 - Z Relay	Connection Diagram
198		Unused	
199		Reserved for Plug-in Relays	



## THE RINGWOOD ACCIDENT

### 21 MARCH 2010

At around 2035 on 21 March 2010, the leading carriage of a six car Xtrapolis set arriving into Ringwood sideswiped T369 on a plant train standing on the Up Belgrave line. The cause of the accident was that an insulated rail joint was located such that the plant train could clear a track circuit, but still be foul of a converging line. The following summary of the accident is based on the Rail Safety Investigation Report of the Victorian Office of the Chief Investigator Transport Safety. The report is available for download on the web.

On the evenings of the weekend of 20/21 March 2010 it was planned to take an absolute occupation of the Up and Down Belgrave lines between Ringwood and Bayswater for the purpose of discharging rail. The planning for the absolute occupation, while not a primary cause of the accident, caused significant delay to the handling of the plant train when it arrived at Ringwood and set the scene for the accident. When planning the absolute occupation it was decided to discharge the rails from the Up line to minimise the risk of damage to structures. The circular for the absolute occupation, however, incorrectly stated that the rails were to be discharged from the Down line. This resulted in the Signaller routing the plant train into the wrong road when it arrived at Ringwood. In preparing the circular, the planners also failed to notify ARTC that the plant train would be travelling over ARTC tracks between the rail loading site at Anzac Siding (Spotswood) and Melbourne and were consequently unaware that this would not be possible due to ARTC infrastructure works. At a late stage it was realised that access could not be granted and the works train was delayed by 20 hours. The track works also necessitated rerouting the train and in consequence the threader wagon was at the Ringwood end of the plant train instead of the intended Belgrave end. The threader wagon actually discharges the rails and must be at the rear of the train as discharging takes place. Consequently it was necessary to for the plant train discharge rails while moving away from Ringwood, instead of towards Ringwood as planned. This confusion seems to be caused by the late notice given to the planning section - the details of the occupation were only agreed upon on the 16 February, resulting in only four days notice, instead of the 10 days required by the Book of Rules and Regulations.

The plant train consisted of B80 and T373 at the leading end, seven CQRX container flat wagons carrying the rails, the CFCF rail threader wagon, and T369 at the rear. It eventually arrived at Ringwood on the evening of Sunday, 21 March. In accordance with the circular, the Signaller signalled the plant train in the Down platform (No 3), intending to route it direct from there to the Down Belgrave line. The Metro Trains (MTM) Safeworking Co-ordinator and MTM Safeworking Manager (acting as the Pilot) arrived as the plant train was arriving into Platform 3 and discussed with the Signaller how to get the train onto the Up Belgrave line. As it was necessary to discharge rails from the Melbourne end of the plant train, it was not possible to run the train right line to Bayswater and return on the Up line; discharging had to occur travelling in the wrong direction on the Up Belgrave line.

It was decided to draw the plant train forward onto the Down Belgrave line, set back to No 2 Platform, and then move forward wrong direction onto the Up Belgrave line. The MTM Safeworking Co-ordinator advised the Signaller that he would inform him when the plant train was in clear within the occupation (which commenced at Home

RWD335). This was confirmed by the MTM Safeworking Manager, but the Signaller did not remember this instruction.

The movements were made as planned and the plant train departed No 2 Platform past RWD324 under authority of a Signaller's Caution Order (as Home RWD324 could not be cleared as it did not apply to moves to the Up Belgrave line). As the plant train moved onto the Up Belgrave line, the MTM Safeworking Manager requested the driver to stop beside some works personnel so that they could discuss the unexpected configuration of the plant train (with the threader wagon at the Melbourne end). By co-incidence the plant train stopped at a point at which the rear axle of the rear locomotive had just cleared the insulated rail joint (IRJ) separating track circuits 324T and 334T. Track circuit 324T consequently showed unoccupied on the panel in the signalbox. When he noticed that the plant train had stopped prior to entering the area of absolute occupation the MTM Safeworking Co-ordinator instructed the crew to continue inside the absolute occupation. The accident occurred less than three minutes later.

In the meantime, the Signaller seeing that the train had cleared track circuit 324T, set the route for an Up Lilydale EMU (Train 3318) to arrive into Platform 2. Train 3318 was a scheduled passenger service comprising of two three car Xtrapolis sets. Although the room in which the control panel was located had a bay window to the track, this was located behind the signaller and provided a poor view of the location of Down end of the yard. It was consequently not practicable for the signaller to visually confirm that the plant train was clear of the fouling point. The route taken by the EMU ran alongside the stationary plant train on the Up Belgrave line before the two lines converged at Points 224. The EMU was travelling at 29 km/h at the time heavy braking was applied, and it took 70 metres to stop. Both the leading vehicle of the EMU and T257 suffered minor damage to side panels and handrails. No staff or passengers were injured.

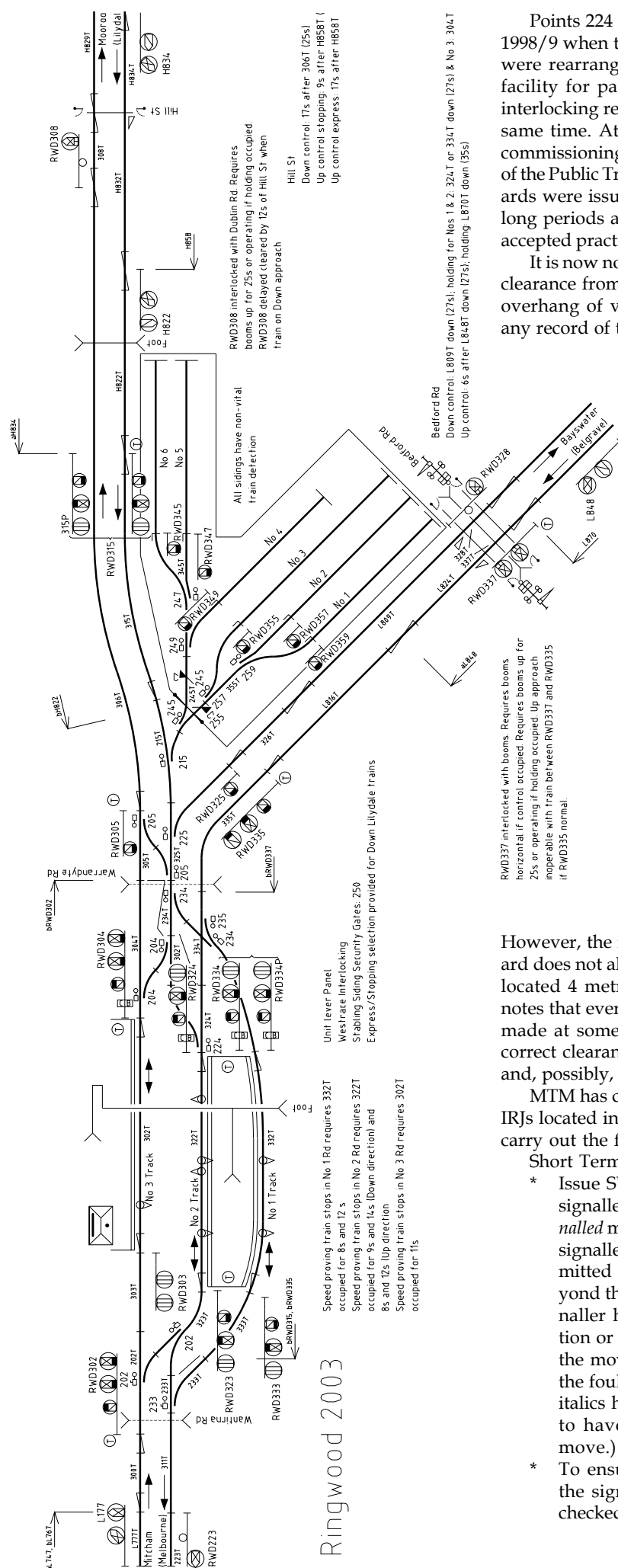
The current standard for the placement of IRJ at clearance points is found in VRIOGS\* 012.0 Victorian Signalling Principles, Revision B dated 16.12.2009. Section 4.4, Track Vacancy Detection, states:

The placement of insulated rail joints (IRJs) or other form of track circuit limit is to be at a distance beyond the track clearance point; which provides for vehicle overhang, such that a vehicle standing beyond the IRJ will not extend foul of the track clearance point.

For broad gauge track work the track clearance point is the point at which there is 4 metres between the centerlines of the adjacent rail tracks. The allowance made for vehicle overhang is 4 metres. This requires that the minimum distance from the clearance point to the IRJ is 4 metres.

For new work the clearance point on broad gauge track is the point at which there is 4 metres between the converging track centrelines. The IRJ must be placed 4 metres beyond the clearance point to allow for vehicle overhang. At Ringwood the IRJ concerned was located where there was only 3 metres between the track centrelines.

\* The Victorian Rail Industry Operators Group, VRIOG, is an industry body that, among other activities sets common standards for the Victorian rail network.



Points 224 and the associated IRJ has been provided in 1998/9 when the track and signalling at Ringwood station were rearranged to provide three platforms and greater facility for parallel moves. The current computer based interlocking replaced the previous mechanical frame at the same time. At this time responsibility for designing and commissioning signalling projects was undertaken by staff of the Public Transport Corporation (PTC). No design standards were issued at that time as design as staff served for long periods and were trained by more senior staff in the accepted practice.

It is now not known why the IRJ was located at 3 metres clearance from the adjacent line with no provision for the overhang of vehicles. The investigation did not identify any record of the development of the design of the signalling at Ringwood, nor did it interview any of the signal engineers responsible. The former PTC signalling design staff is, of course, now scattered to the four winds.

The report speculates that the location of the IRJ could have been due to track constraints resulting from the road underbridge located near this point, although this would seem to be unlikely as the underbridge is a substantial distance away. Alternatively, it could have been a design oversight. A third possibility, not canvassed in the report, was that the location was convenient in terms of the track layout, particularly in relation to the rail ends of the adjacent turnouts. It is to be regretted that the report does not include a scale drawing of the tracks in the region of the IRJ, indicating the clearance points and adjacent IRJs.

Under normal operations, the location of the IRJ was not a safety issue. All signalled moves over the IRJ were Up moves and the movements required both 324T and 334T track circuits clear.

However, the report makes it clear that the VRIOG standard does not allow the IRJ location to be varied - it must be located 4 metres beyond the clearance point. Further, it notes that every movement, signalled or not, is likely to be made at some point and that not locating the IRJ at the correct clearance point is likely to cause unsafe situations and, possibly, an accident, as it did on this occasion.

MTM has concluded that it is likely that there are other IRJs located in a non-compliant position. It has decided to carry out the following actions:

Short Term:

- \* Issue SW 52/10 that requires that when a non-signalled movement is performed, “no other *signalled* move toward the area from which the non-signalled movement is being conducted is permitted until the first movement has cleared beyond the protecting signal, or if not, that the Signaller has ascertained – by personal observation or by liaison with the operator in charge of the movement – that the movement is clear of the fouling point of any adjoining line.” (Text in italics has been added - no consideration seems to have been taken of a second unsignalled move.)
- \* To ensure that all project work complies with the signalling principles and standards and is checked for compliance.

- \* To ensure that the location of all IRJs is confirmed before and after any projects part of the annual works program.
- \* To ensure that all fouling and clearance points are reviewed during the planning phase.
- \* To train MTM staff to recognise track circuit limit locations and how to determine fouling and clearing points.

#### Medium Term

- \* The location of all IRJs at turnouts to be checked for compliance and recorded.
- \* Risk assessments to be performed on all non-compliant IRJs, and operations and signals staff to determine appropriate remedial actions.

#### Long Term

- \* Non-compliant IRJs to be altered to comply.

The Office of the Investigator made two additional safety recommendations:

- \* That Signallers be made aware of any non-compliant IRJs so that Signallers are familiar with any operational peculiarities of their interlockings and can protect unsignalled moves.

- \* That the location of IRJs be shown on all signalling and interlocking design plans. Currently VRIOS only requires this on layout plans for level crossing control.

The report does make some interesting statements. On page 17 it notes that the route from RWD324 to the Up Belgrave line was an unsignalled move. It then makes the statement that if it had been a signalled move, the interlocking would have been set up such that the route would have been held until the plant train had passed Up Home RWD335 (hence Points 224 would have been held normal and signal RWD324 at stop until track circuits 324T, 334T, and 335T were clear). This implies that train operated route release is not the practice in Victoria, even on computer based interlockings. On page 20 it notes that, although the Signaller issued a Caution Order to the driver of the plant train to pass RWD315 at danger, this was incorrect as RWD324 did not apply to the route towards the Up Belgrave line. The correct approach would have been to verbally authorise the Driver to pass the RWD315 after the driver had signed the Absolute Occupation.

## THE COOTAMUNDRA INCIDENT

12 NOVEMBER 2009

The ATSB has just released a report on a near miss at Cootamundra, NSW, that was caused by the same issue as that identified at Ringwood - an IRJ not located at the clearance point. In this case, however, the signalling installation was sufficiently recent that the ATSB were able to determine that the location of the clearance point was a design error. The following summary of the accident is based on the ATSB report which is available for download on the web.

Early in the morning of the 12 November 2009 ST22, the Up XPT from Melbourne, was signalled into the platform loop (No 1 Road) at Cootamundra. The driver received a Medium Turnout indication on the Home CA72 controlling the movement. As the train passed over the turnout into the platform loop, the driver noticed that the rear of freight train 4MB7 standing in No 2 Road was foul of the route his train was taking. Fortunately, the driver was able to stop the XPT before colliding with the freight train as the speed limit through the turnout is only 25 km/h (in fact the XPT was travelling at only 20 km/h when the driver became aware that the rear of the train was fouling his route). The cause was that the IRJ marking the clearance point in No 2 Road for the route over the turnout into No 1 Road was not located at the clearance point of the two roads.

Turnout 136 leads from the single main line to the platform loop (No 1 Road) at the Down end of Cootamundra. The Gundagai Rd level crossing is located immediately after the turnout, and beyond the crossing is Crossover 133 leading from the main line (No 2 Road) to the yard. The Gundagai Rd crossing is equipped with Type F flashing light and boom barriers.

One of the major changes during the resignalling of Cootamundra was to convert the Gundagai Rd crossing from manual operation from the former adjacent signalbox to automatic operation, and as part of this alteration the track circuits on the main line (No 2 Road) were altered. Before the resignalling a single track circuit extended from the toe of Turnout 136 to the clearance point at the Up end of Crossover 133. As part of the resignalling, this track circuit was split into two: CA74CT extended from the toe of Turnout 136 to the Up side of Gundagai Rd, and CA74DT

covered the remaining distance to the clearance point of Crossover 133. The track circuit was split in order to shorten the island track circuit over the level crossing and allow the booms to rise earlier when a train has cleared the level crossing. Unfortunately, when designing the signalling control circuits for Home CA72, the IRJ between CA74CT and CA74DT was taken as the fouling point for movements into the platform loop. The clearance between the centre lines of the two tracks at this IRJ was only 1410 mm; the minimum required was 2016 mm (and this does not take into account the overhang of the rear wagon).

Resignalling Cootamundra yard was undertaken by the Southern Improvement Alliance (SIA) in 2006/7. The SIA is an alliance agreement between ARTC and a number of partners to improve the Melbourne - Sydney rail corridor. The main SIA partners were ARTC, John Holland Rail, MVM Rail, and O'Donnell Griffin (ODG). 'Sub-alliance' partners were Kellogg Brown and Root (KBR), GHD Pty Ltd, and CW-DC Pty Ltd who provided specialist design services.

A scope/outline for the Cootamundra resignalling was provided to the SIA by ARTC late in 2006. The SIA then developed a project brief, concept plan, and cost estimates. These were accepted by ARTC early in February 2007. The design phase was commenced by the SIA in September 2006 (sic), with final commissioning of the resignalling occurring in September/October 2007. The system installed was a Microlok interlocking driven by a Phoenix CTC system from Juneec control.

The design process of the signalling was conventional. The existing interlocking plans, circuit diagrams, etc, were supplied to SIA and formed the basis for the resignalled layout. Data design, factory testing, and onsite testing generally followed development of the control tables, however towards the end of the project it was necessary to develop the control tables at the same time as developing the software (MicroLok configuration and logic is expressed as a program which is compiled into a form that can be executed). The engineers involved in the project felt that the tight project time frame compromised the normal testing process and probably limited their ability to detect errors.

ARTC design standard SCP08 required the designers to identify all clearance points. Further, although the new signalling was largely based on the existing mechanical signalling layout, one specific change was the addition of the new IRJ. The ATSB considered that the designers should consequently have positively identified the clearance point and its relation to the new IRJ. They commented that it was clear that the designers did not have an understanding of the local geography at Cootamundra. Because the clearance points were not explicitly shown on the Signalling Arrangement Plan or included in the test plan, the on-site installers and testers did not realise that the new IRJ was the clearance point, nor test that the clearance was adequate.

SIA had a simple quality control procedure during the Cootamundra resignalling (this procedure was subsequently improved). Issues identified by checkers were annotated on the Signalling Arrangement Plan/Control Table and returned to the designers for resolution. The annotation was signed off when the issue was resolved to the satisfaction of the checker. However, at least two engineers stated that they had separately raised the possible clearance issue at this IRJ on their copy of the SAP, but the issue had not been properly closed out.

The ATSB found the following significant safety issues had contributed to the incident. First, the designer engineers did not effectively identify and record the fouling

point of the route into No 1 Road. This was caused by the long standing practice of not explicitly recording the clearance points on the Signal Arrangement Plan, Track Insulation Plan, or Control Tables. Second the documentation and quality control processes were not sufficiently robust, in particular the closing out of design issues. A minor safety issue identified was that the clearance point had been selected without actually confirming that the clearance was adequate.

In response, ARTC has, among other actions, updated the track standards to include the process for identifying the clearance points, the signal standard to refer to the track standard for identification of clearance points, and the rolling stock standard for approvals of rolling stock with a greater than 3 metre overhang. The Track Design Engineer has been nominated as the person responsible for identifying clearance points, and where the track is unchanged the track engineer will identify the clearance points as installed. This information to be recorded and managed. Clearance points are to be explicitly recorded on Signalling Arrangement Plans, Track Insulation Plans, and Control Tables. Clearance points will be explicitly tested during commissioning and a record made of the tests. The ARTC will also develop a standard process for raising signalling issues during the design process and recording their resolution.

## THE CRAIGIEBURN ACCIDENT

### 4 MAY 2010

At about 2035 on 4 May 2010 the 1949 Down Craigieburn suburban passenger train (Train 5863) collided with the rear of Pacific National freight train 9319 standing on the Down main line at Patullos Lane about 2 km south of Craigieburn station. The driver of the suburban train and four passengers required hospital treatment. Both trains were extensively damaged. The collision occurred after dark. It was not raining at the time of the accident, though a small amount of rain had fallen about an hour earlier. The following summary of the accident is based on the Rail Safety Investigation Report of the Victorian Office of the Chief Investigator Transport Safety. The report is available for download on the web.

Freight train 9319 consisted of locomotive G524 and 21 empty hopper wagons running from Brooklyn to Kilmore East. The train departed from Brooklyn at 1920 and was routed via Sunshine and the goods line to Broadmeadows. As the train passed Sunshine signalbox, the signaller conducted a roll-by inspection and informed the train crew that the end-of-train marker (ETM) was in place and operating. Operation of the ETM was confirmed by CCTV footage at Roxborough Park. Approaching Craigieburn the train passed E809 displaying normal speed warning and stopped at Controlled Auto CGB539. The crew stated that they made several attempts to contact the Signaller at Craigieburn but were unsuccessful.

At Craigieburn Up Home CGB522, applying to departing moves from No 2 Platform to the Up line, had failed due to vandalism preventing correct operation of the train stop. It was consequently necessary to issue caution orders to allow Up suburban trains to depart past the home signal. Up suburban passenger train 5262 was consequently delayed at the platform while the signaller left the office to issue a Caution Order to pass CGB522 at stop, and this required the freight to be held at CGB539.

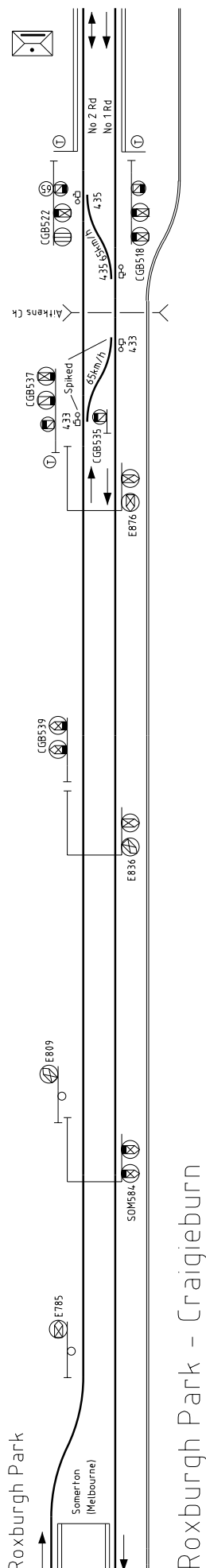
While they were waiting at CGB539 the freight train crew observed in their rear-view mirrors a train approach-

ing from behind. The train struck the freight with such force that they were dislodged from their seats and caused the engine of G524 to shut down (it was subsequently discovered that the diesel engine had shifted almost 75 mm from its mountings from the force of the collision). Almost immediately they were contacted by the Signaller Craigieburn to inform them that they could now proceed, but they responded that they had been hit by a following train. The train crew then contacted Control to arrange protection of the Up broad gauge line and Juneec Control to stop traffic on the standard gauge line. The train crew then stopped a Melbourne bound suburban train by using their headlights and marker lights and used it to travel to the back of their train where they rendered assistance.

The suburban passenger train involved in the collision was a six car Comeng consisting of 570M-1135T-661M-310M-1005T-309M. It was equipped with a VICERS recorder that provided valuable confirmation of the operation of the train.

Departure of the suburban train from Roxburgh Park was about a minute late. The master controller was then stepped up to notch 4 (maximum power) until the train reached 34 km/h when power was cut off. Braking was then engaged, ranging from notch 1 to 5, as the train approached Auto E785 which was at stop as the freight train was still occupying the track ahead of E809. When the speed had been reduced to about 9 km/h the brakes were released and the train coasted to E785. It rolled past E785 at about 3 km/h and was tripped to a stop. The brakes were then released and the train continued on its journey after a stop of about 38s.

After being tripped to a stop at E785, the train was accelerated under full power until it reached a speed of 63 km/h. It then coasted for about 5 seconds before braking commenced for Auto E809, which was also at stop. The operation of the train on the approach to E809 was similar



to that for E785. The train passed E809 travelling at about 4 km/h with the brake controller still in notches 1 or 2. It was again tripped to a stand. The train continued its journey after a stop of about 34 seconds, and again the train accelerated under full power for 41 seconds achieving a speed of 69 km/h. Power was then shut off and the train coasted for 13 seconds with the speed falling to 66 km/h on the rising grade.

With the train now approximately 116m from the rear of the freight train, the brake controller was moved to the emergency position. Six seconds later the EMU collided with the rear of the freight train at 47 km/h. The suburban passenger train came to rest approximately 16m beyond the point of impact.

Both trains were extensively damaged. The leading motor of the suburban train suffered significant damage to the coupler, headstock, and underframe. All the permanent couplings of the leading car three car set, together with the interset coupling, had fully collapsed. The trailing end of 1135T overrode the leading end of the second motor 661M causing significant structural damage to the motor car. The collision posts at the leading end of 661M had rotated backwards and had become detached at the top. The rear facing seats on the bulkhead had also been pushed back. It was fortunate that no passengers were seated in this area. An engineering assessment found that the structures, couplers, and drawgear generally performed in accordance with the crashworthiness design requirements for the Comeng design, but that some aspects did not perform favourably (notably the collision posts). The freight wagons suffered damage to their bogie trunnions and one bogie was dislodged. The locomotive suffered severe damage with the diesel engine shifting off its mountings by about 75mm.

Correct operation of both the signalling system and the braking system of the EMU was verified by audit logs.

The relevant rule for passing an Automatic Signal at stop (Section 3 Rule 1) is:

(a) Automatic Signal at stop

The Driver must bring the train to a stand for 30 seconds if an automatic signal displays 'Stop'. If the automatic signal is still at 'Stop' after 30 seconds, the Driver may proceed, but must control the speed of the train at extreme caution, being prepared to find the section ahead occupied or obstructed, or the track damaged.

Extreme caution is defined as being able to stop the train in half the distance that can be seen ahead; not exceeding 25 km/h or the posted track speed if that is the lesser, and always being prepared to find the section ahead occupied or obstructed, or the track damaged

The driver of the suburban train stated that he had no recollection of the events leading to the accident. The driver had qualified as a suburban train driver in 1995 and had been assigned to either Broadmeadows or Craigieburn depots since 2002. Prior to qualifying as a driver, he had been a suburban guard for about two years.

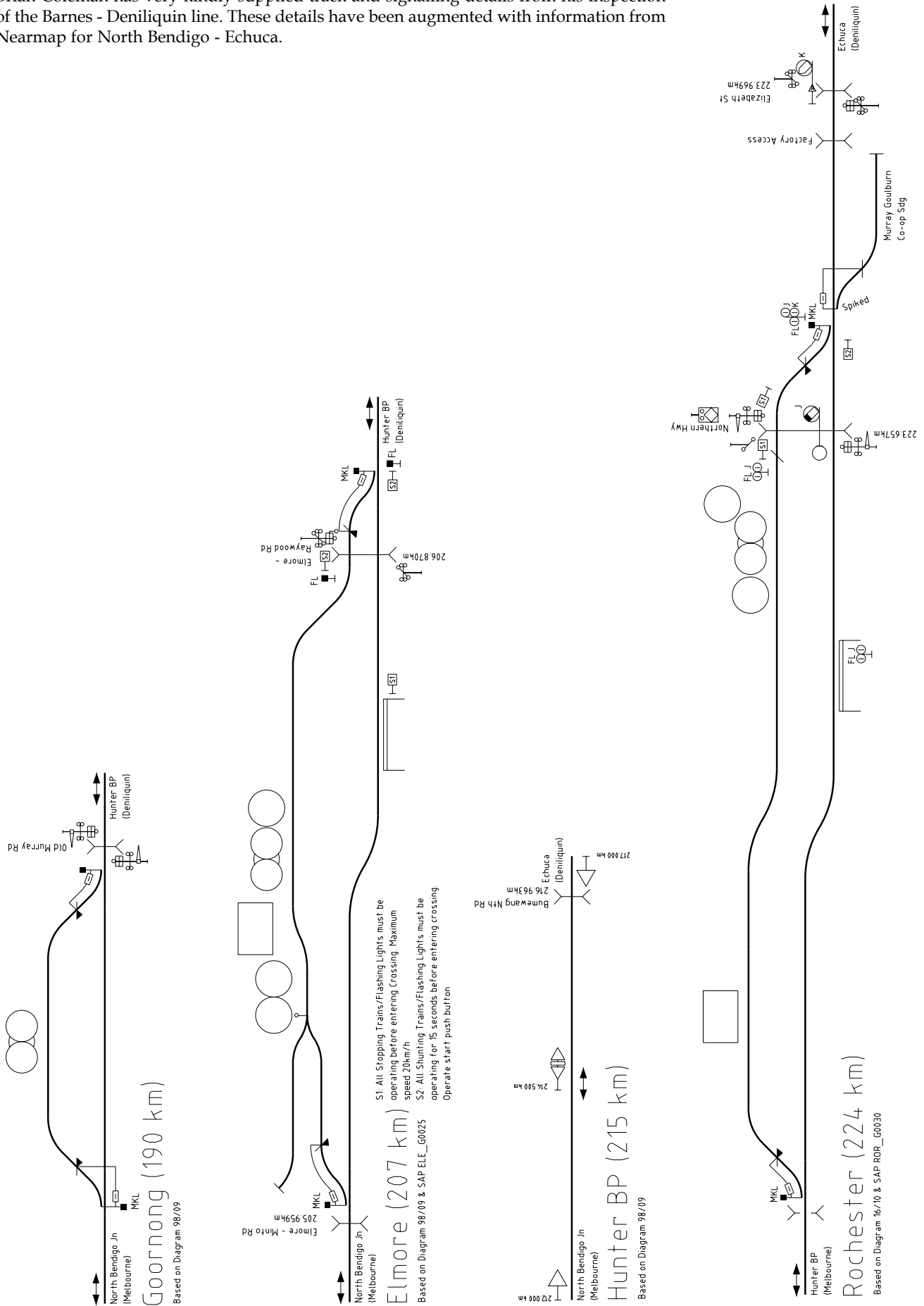
As part of the investigation an ETM used on the back of the freight train was tested against the Australian RISSB standard 'Railway Rolling Stock Lighting and Rolling Stock Visibility' AS 7531.2.207 (which has not been adopted in Victoria), the UK standard GM/RT 2483, and the US regulation 49 CFR 221.14. AS 7531.2.207 required a luminous intensity of 0.75 candela per light (based on the withdrawn Standard AS1165), or 100 candela where permissive working was in use. The tested ETM had a peak intensity of 3 candela 'on axis' (i.e. straight down the line) which fell off as the viewing angle changed. The ETM met the 0.75 candela requirement of AS7531.2.207 except in one direction. However, this was still 10 to 25 times less than the intensity required by the UK standard and 30 to 50 times less than the US regulation. The test also measured the effect of battery voltage. A half volt drop from the nominal 6V battery voltage reduced the light intensity by one quarter, and if the voltage dropped one volt, the intensity was just over half of the maximum. Testing by MTM suggests that the ETM would be visible for over 1000m in 'good dark conditions', but only 186m in conditions comparable to those of the accident.

The investigation identified the following issues:

- \* That Section 3 Rule 1 on passing automatic signals at stop be reviewed, and its application monitored. The report suggested that the current rule encouraged drivers to expect the line to be clear (i.e. the signal to have failed) when passing an automatic at stop. In particular, the report strongly encouraged changes to the rule so that drivers must report when they are intending to pass a signal at stop.
- \* That it was likely that the driver allowed himself to become compla-

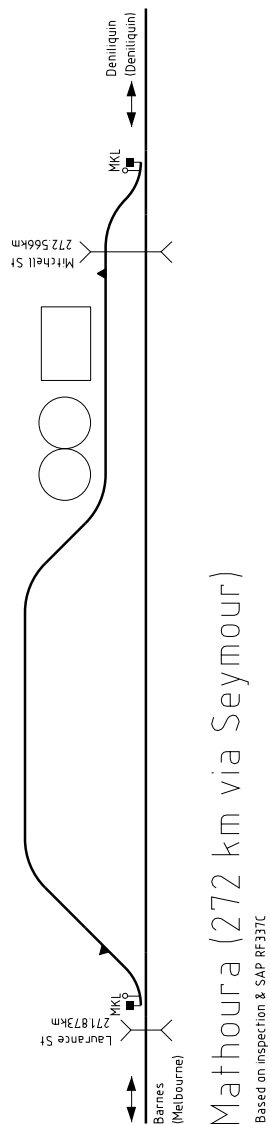
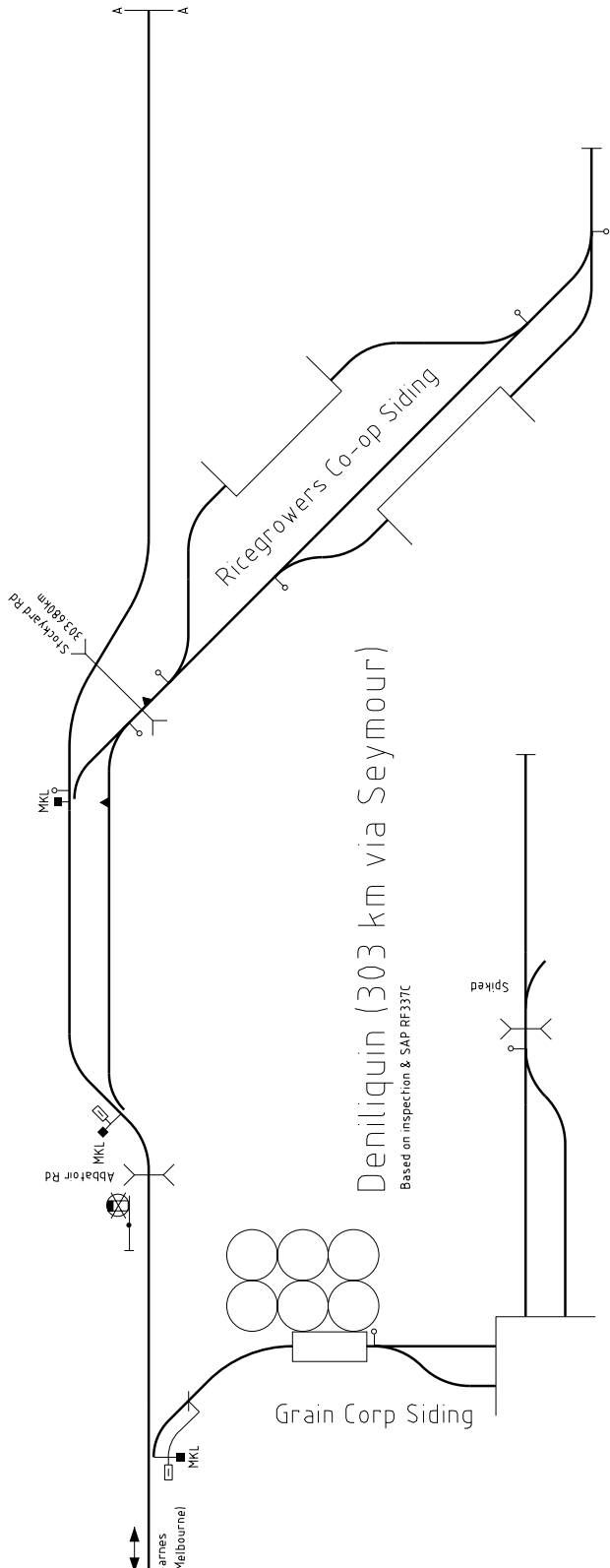
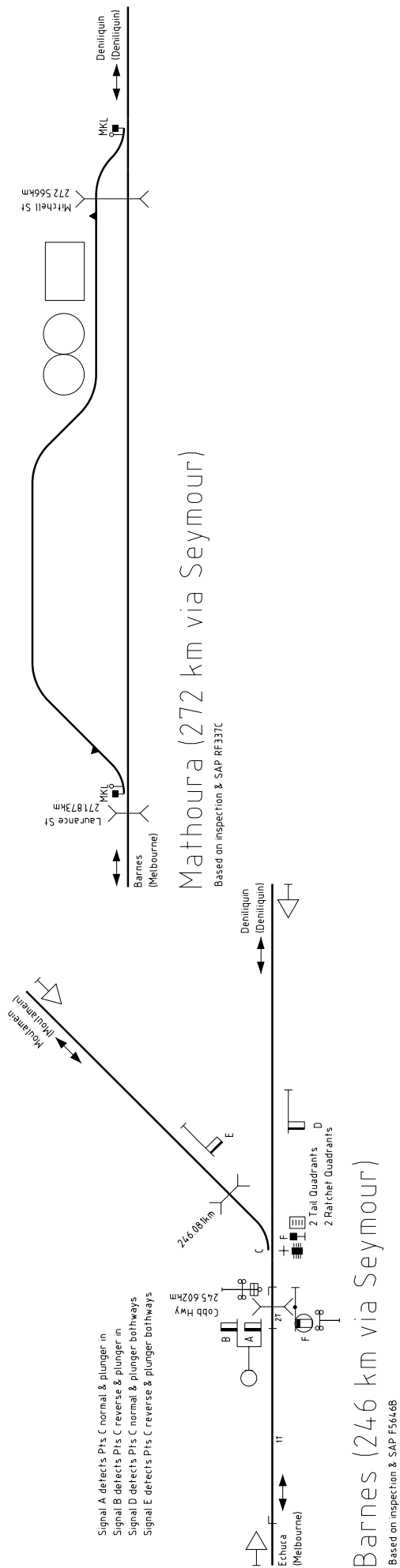
## BENDIGO - DENILQUIN 2011

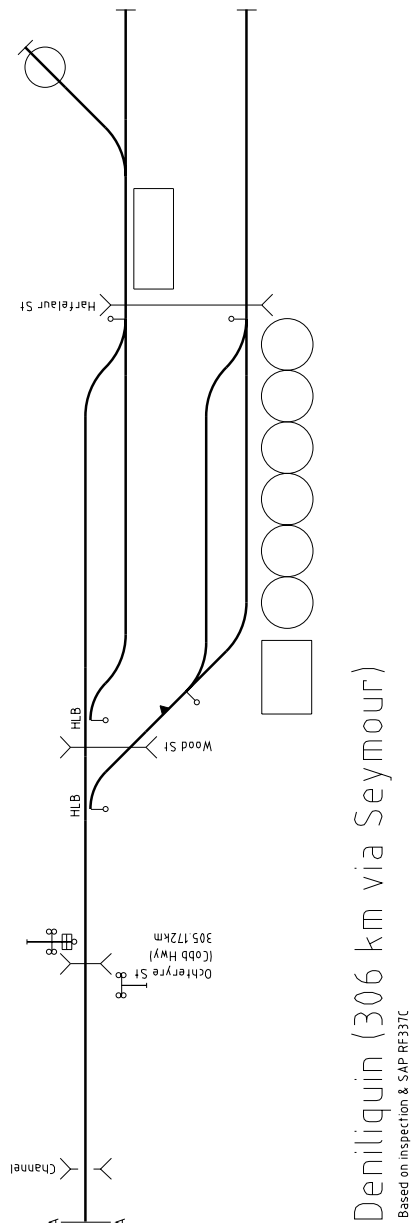
Brian Coleman has very kindly supplied track and signalling details from his inspection of the Barnes - Deniliquin line. These details have been augmented with information from Nearmap for North Bendigo - Echuca.











Continued from page 68

cent, shortcut the procedure when faced with an automatic signal at Stop, and then not comply with the speed restriction because he believed the line ahead was clear and the signal was not indicating the correct situation.

- \* That ETM standards have not changed since 1985, but since that time signal lights have become much brighter with the introduction of LED signals. This increased brightness could have an adverse affect on the sighting of ETMs by following train drivers.
- \* That the collision posts at the ends of trailer cars and non-driving ends of Comeng motor cars might be vulnerable in the event of overriding in a collision, particularly as anti-climbing devices are not fitted.

The report made the following recommendations:

- \* That MTM consider some form of speed limiting device to prevent exceeding the speed limit after passing a signal at danger.
- \* That MTM review the content of Section 3 Rule 1 and its application.
- \* That MTM monitor compliance to Section 3 Rule 1.
- \* That MTM review the number of automatic signals with a view to reducing their number and reducing the need to apply Section 3 Rule 1.
- \* That the Victorian rail operators review Section 3 Rule 1 to make it consistent between the 1994 Book of Rules and the ARTC Code of Practice.
- \* That the Victorian rail operators review available ETM products to enhance their visibility and give consideration to implementing a higher standard for visibility than AS 7531-2007.
- \* That MTM review the strength of the collision posts fitted to Comeng trains and consider the provision of anti-climbing devices.
- \* That MTM review the method of attaching overhead fittings in Comeng trains.